

## Liquid and Gaseous Hydrogen Specifications & DOT Shipping Information



CHARACTERISTIC	PROCURED/DELIVERED	DELIVERED (SHUTTLE ONLY)
SPECIFICATION:	<a href="#">MIL-PRF-27201C</a> , Type I and II*	SE-S-0073, Table 6.3-6
Purity	99.995% by vol. (min.)	99.994% by vol. (min.)
Total gaseous impurities	50 ppm by vol. (max.)	60 ppm by vol. (max.)
Total nitrogen, water and volatile hydrocarbons combined	9 ppm by vol. (max.)	9 ppm by vol. (max.)
Oxygen plus argon	1.0 ppm by vol. max.	5 ppm by vol. (max.)
Helium	39 ppm by vol. (max.)	45 ppm by vol. (max.)
Carbon-bearing gases other than CH <sub>4</sub> (CO plus CO <sub>2</sub> )	1 ppm by vol. (max.)	1 ppm by vol. (max.)
Para-hydrogen (balance Ortho-hydrogen)	95.0% by vol. (min.)	N/A

\* I is not separately procured but rather made from LH2 via a recharger.

Note: JBOSC provided filtration (20-micron) is only on the outlet of the recharger.

Usage & Other Data: LH2 is a cryogenic fuel used in combination with liquid oxygen in the Shuttle main propulsion system, Shuttle fuel cells, Delta IV expendable launch vehicle and in the Centaur upper stage on Delta IV & Atlas 5 expendable launch vehicles. GH2 is used to pressurize ground support equipment associated with Shuttle fuel cell systems.

Proper Shipping Name and Container Markings:

49 CFR

172.101 Hazardous Materials Table

Sym-bols	Hazardous material descriptions & proper shipping names	Hazard Class or Division	Identifi-cation numbers	PG	Label Codes	Special Provision	Packaging (173.***)			Quantity Limitations		Vessel Stowage	
							Excep-tions	Non Bulk	Bulk	Passenger aircraft/ rail	Cargo aircraft only	Loca-tion	Other

DOT Hazardous Material Codes and Regulations will explain the letters and numbers.

Sample Table

	Hydrogen, refrigerated liquid	2.1	UN1966		2.1		Packaging (173.***)			Quantity Limitations		Vessel Stowage	
							None	316	318, 319	Forbidden	Forbidden	D	40



Markings for a "bulk container" (over 119 gallon capacity) with 12"-sided placards. An authorized variance would have the identification number replace the words on the primary hazard placard (with the number at the bottom corner). Non-bulk containers would use the similar 3"-sided labels and have "UN(ID#)" nearby. The proper shipping name would also appear near the labels or placards.



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